Jackson East Project

Subarea Best Practices Report

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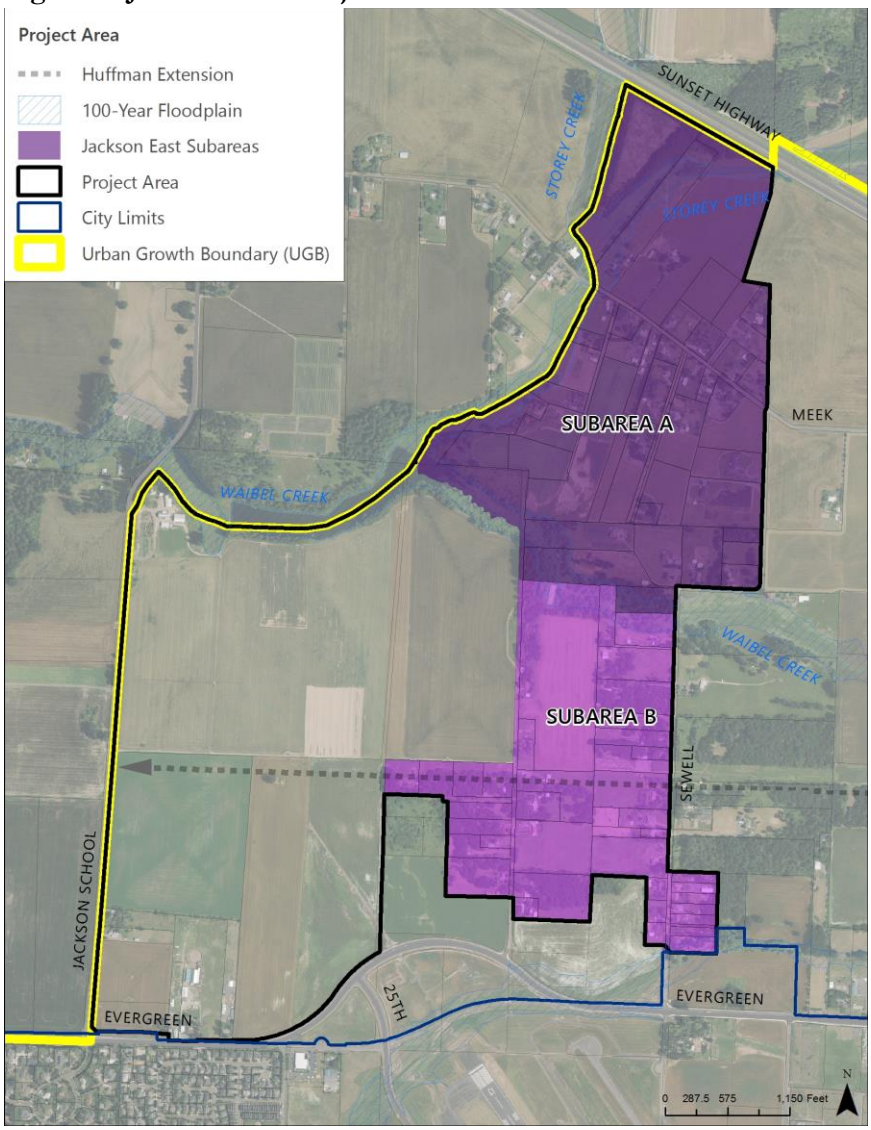
I. Introduction

The Jackson East project area includes 545-acres of land brought into the Urban Growth Boundary (UGB) as a result of House Bill 4078 and 125-acres of adjacent rural-residential land along NE Sewell Avenue brought into the UGB in 2005. The project area is bordered on the north by U.S. Highway 26; on the south by NW Evergreen Road; on the east generally by NE Sewell Avenue; and on the west by NW Jackson School Road and Waibel and Storey Creeks. The North Hillsboro Industrial Renewal Area is located to the east of the project area. The Jackson East project area's western portion is not included in this best practices report because it is primarily large-lot vacant or partially vacant land under common ownership that will require little land assembly for future employment development consistent with its UGB expansion. This best practices memo is focused on the cluster of highly-parcelized, rural-residential properties found in Subareas A and B, located north and south of Waibel Creek respectively (See Figure 1.)

Figure 1. Jackson East Project Area



Source: City of Hillsboro, Metro RLIS, and Washington County GIS data

This document reports on lessons related to research on best practices within the planning and development sectors related to circumstances experienced in the Jackson East Subareas. Specific issues for investigation include:

- (Re)development of Rural Residential Areas for Industrial
- Industrial and Residential Use Proximities
- Airport Compatibility
- Natural Areas as an Organizing Principle for Development

This research will inform the upcoming master planning process and development of an implementation guide for the Jackson East Subareas. Learning about the options for policies and future on-the-ground conditions will assist the City of Hillsboro with identifying the appropriate land use designations, infrastructure investments, and related design considerations for the Jackson East Subareas.

II. Site Conditions

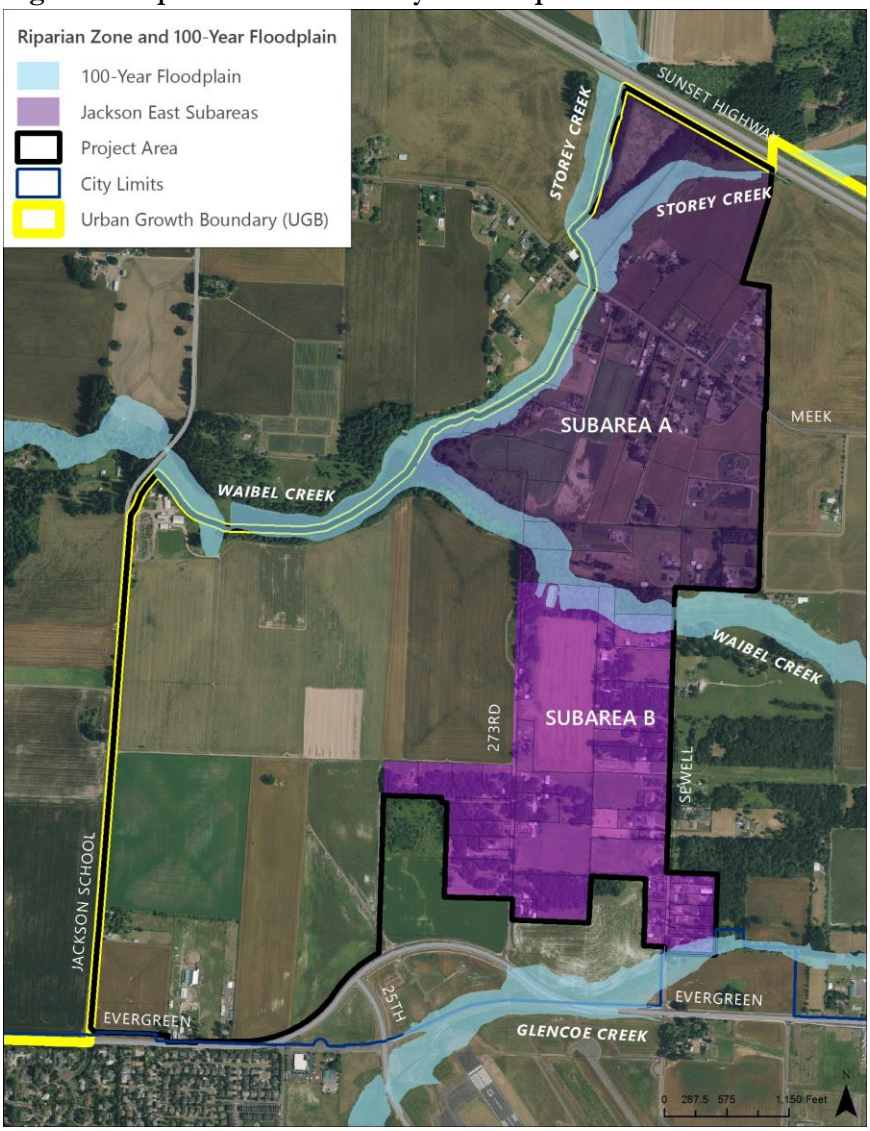
At the outset of any planning project site conditions must be considered. Described below are the Jackson East Subareas' existing conditions.

A. Natural Features and Topography

The Subareas contain rolling topography. Waibel Creek serves as a natural boundary between Subareas A and B (See Figure 2.) Storey Creek flows south from U.S. Highway 26 to connect with Waibel Creek. Storey Creek's western arm, bordering farmland, results in a triangle of land in the northwest section of Subarea A. The Waibel Creek and Storey Creek corridors vary in states of health due to agricultural tiling[1] over the past hundred plus years.

[1] "Agricultural tiling" is a type of drainage system that reroutes surface water from below the surface.

Figure 2. Riparian zone and 100-year floodplain



Source: City of Hillsboro, Metro RLIS, and Washington County GIS data

B. Exception Areas

Two primary objectives of Oregon's land use planning program, the protection of resource lands and fostering the orderly and efficient use of urban land, can sometimes conflict. Large vacant tracts of land are typically favored by the development community because of single-owner transactions and the limited number of existing structures. The lands that fit this description have often historically been in farming or forestry use. Accordingly, when the Metro region looks to expand its UGB it must weigh the tradeoffs between development efficiency and preservation of the farming and forestry economies. Subareas A and B were brought into the UGB in part because they were "exception areas", or land that was physically developed at the outset of the Statewide Planning Program in the 1970s and received an exception to Statewide Planning Goals 3 or 4 because its use was impractical for farm or forestry resource. Planning for the (re)development of Subareas A and B begins with an acknowledgment of their "exception area" status.

C. Title 4 Lands

The Metro Urban Growth Management Functional Plan provides tools to meet goals of the 2040 Growth Concept, Metro's long-range growth management plan for the Portland metropolitan area. Metro Title 4 includes providing and protecting a supply of sites for employment by limiting the types and scale of non-industrial uses in Industrial areas. The Jackson East Subareas fall within a Metro Title 4 Industrial Area. Title 4 does not prohibit residential uses in Industrial Areas. Title 4 does require that cities include measures to limit new buildings for commercial uses in order to ensure that they serve primarily the needs of workers in the area.

D. Land Use Patterns

Subareas A and B have been identified due to their differing development patterns as compared to the western portion of the Jackson East project area. The Subareas are currently developed in a rural-residential pattern, within which smaller developed acreages include lots with one house and one or more non-habitable outbuilding (such as a barn). The properties receive their water from individual wells and each site has its own septic system for waste. The rural zoning that shaped this pattern typically allowed for one house for every 5 or 10 acres of land. The current Washington County zoning applied to these sites is Future Development (FD)-20, a holding zone for properties brought into the UGB to forestall development until urban zoning is applied following annexation. Accordingly, except for a few exceptions related to public facilities, no new lots of any size less than 20 acres may be created. However, existing lots can be built upon.

Within the 325 acres of Jackson East's Subareas A and B, the average lot is approximately 4 acres. As shown in Figure 3, 55 net acres of the land in Subareas A and B land is vacant (does not contain any structures), and another 176 acres are mildly encumbered by at least one structure. As a result of the historic rural residential pattern and parcelization of lots in the project area, new development, beyond one single-family dwelling or other low intensity allowed use, will often rely on assembling (purchasing) multiple properties.

Figure 3. Acreage and Land Use in Subareas A and B

Category - Subareas	Quantity (acres)
Gross Acres	325
Constrained Acres	94
Net Acres (Gross – Constrained)	231
Net Vacant Acres	55
Net Partially Vacant Acres	176

Source: City of Hillsboro, Metro RLIS, and Washington County GIS data

E. Planned Improvements

Directly to the east of NE Sewell Avenue, the City is working to implement its plans for the North Hillsboro Industrial Renewal Area (IRA). With multiple large-lot sites and conditions related to expansion of the UGB, the IRA is likely to have a range of large industrial companies, similar to those that currently exist south of NW Evergreen Road and east of NW Brookwood Parkway. The IRA Plan calls for the extension of NW Huffman Street

from east to west through the IRA. NW Huffman Street is eventually to extend through the Jackson East Subareas to NW Jackson School Road. The IRA Plan also calls for the a new NE 30th Avenue to extend from NW Evergreen Road to NW Meek Road immediately east of the Jackson East Subareas. In addition, these plans involve the extension of the Crescent Park Greenway through the IRA and the Jackson East Subareas. These improvements are discussed in more detail in the Transportation Infrastructure and Public Utilities and Services reports prepared by Otak, Inc.

F. Airport Impacts

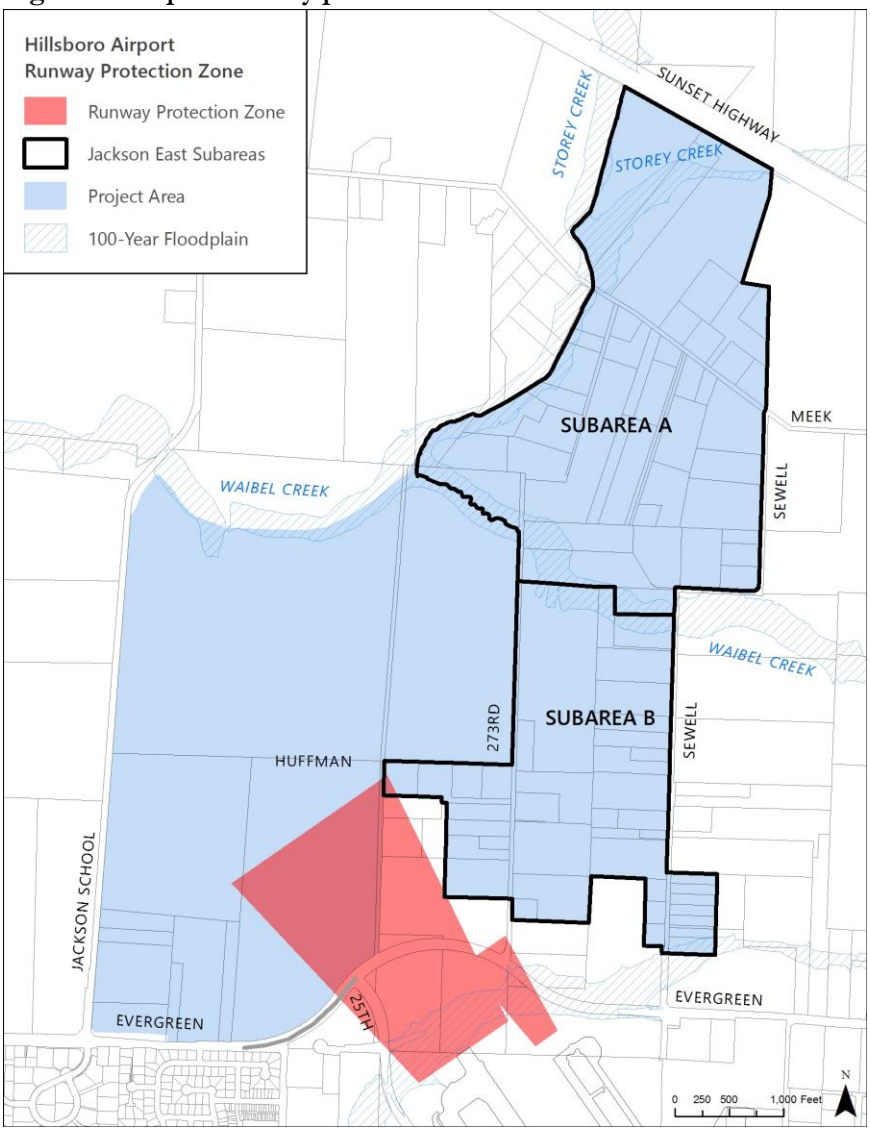
The Jackson East project area is located directly north of the Hillsboro Airport (HIO), which influences land use and development in the project area. HIO is owned and operated by the Port of Portland. The Federal Aviation Administration (FAA) provides recommendations for the type and density of development allowed within airport impact areas; the FAA's concerns are primarily related to the safety and reliability of airport operations, and minimizing impacts to surrounding properties and residents/employees. Minimizing nuisances to surrounding properties also minimizes the number of complaints the airport receives.

Potential airport impacts include: land use restrictions to minimize sensitivity to the noise generated by the airport; land use restrictions to minimize large gatherings of people within critical flight areas; development restrictions (primarily building height) to reduce potential conflicts with flight patterns; and stormwater management restrictions to ensure that waterfowl are not drawn across the multiple "flight paths" that depend on type of aircraft, weather, surrounding land uses, etc.

Land Use and Development Restrictions

The most critical airport impact area is the runway protection zone (RPZ), which is an area intended to protect aircraft and those on the ground during takeoff and landing. Other FAA regulations protect the airspace. The RPZ is shown in white in Figure 4. The RPZ has a limited overlap in the western edge of Subarea B.

Figure 4. Airport runway protection zone



Source: City of Hillsboro, Metro RLIS, and Washington County GIS data

In order to project the reliability and safety of airport operations, development within the RPZ is highly restricted. For this reason, the Port of Portland has purchased properties within the RPZ to prevent conflicts with adjacent development and uses.

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Stormwater Management Restrictions

Oregon state law has established restrictions on stormwater treatment areas in order to reduce the potential for the gathering of birds and mammals that could either cause danger or fall victim to incidents related to airport operations. Generally, standing water of more than ¼ acre in size is prohibited within 5,000 feet of the airport runway. This 5,000 buffer encompasses much of the Jackson East Subareas.

III. Best Practices

A. (Re)development of Rural Residential Areas for Industrial

Different industrial users have different needs in terms of lot size. Industry is generally limited in location choice to areas with ready access to infrastructure and lots ranging from 2 to 200 acres. However, smaller lot industrial properties (2 to 10 acres) are typically created through the subdivision of large site, often in an industrial park setting.

Although conversion of industrial uses to residential uses is fairly routine in urban areas, conversion of residential uses to industrial uses is less common. The Jackson East Subareas being highly-parcelized provide an opportunity for smaller-scale industrial use as an alternative to large-scale parcel assembly. During a site visit to the project area, the project team observed that there appear to be several existing home-based industrial uses in the southeast corner of Subarea B. An opportunity exists to gradually convert these informal uses to more formal, small-scale industrial uses.

Though the concept of business incubators has been around since the mid-1980s, there has been an increase in "industrial incubators" in the Unites States and elsewhere in the past 10 years or so. These spaces are typically small in size (less than 5,000 square feet) and provide a flexible location for new industrial businesses. Often, incubator spaces share space, large equipment, and some clerical support, and offer a low-cost entry for a new business.

These spaces typically provide small spaces to small, growing companies looking to minimize the overhead costs of tools, space, and meeting space. They can also provide an opportunity for new businesses to test the market for their product or service before investing in larger, more permanent facilities. Generally, industrial incubators are found in urban areas with strong transit connections or in areas with a strong current or past industrial presence.

To accommodate larger site industrial uses, developers would likely need to assemble multiple contiguous properties to attain the desired acreage. This type of activity is common place but typically limited to a small number of parcels. A typical example would involve increasing the size of a currently owned property through purchase from a neighbor. Another option for land assembly is through use of a Real Estate Investment Trust (REIT). REITs are entities that are formed for the specific purpose of owning and managing lands or facilities. REITs can also be used to market land for sale. Through a REIT, land owners would transfer ownership to the REIT and receive shares in the entity in proportion to the value of their property. The REIT would then market the multiple holdings as if they were one or more properties. The board, comprised of owners, could then choose to sell or lease the land as a longer-term investment.

Examined Practices

Many communities, including Marshfield, Wisconsin; and San Francisco, California, among others, have partnered with the private sector to create incubator spaces for small-scale manufacturers. The City of Marshfield, Wisconsin, is partnering with a private developer to create an approximately 5,000 square foot "industrial incubator space" on a site formerly in

agricultural use and currently zoned for industrial development.[2] The existing home and three outbuildings are being remodeled for office and storage space to support the incubator uses. See Figure 5.

The City of San Francisco established the Small Enterprise Workspace (SEW) use in 2009 to allow the establishment of incubator spaces in industrial zones in the City. Small Enterprise Workspace is defined as "a use comprised of discrete workspace units of limited size that are independently accessed from building common areas".[3] Initially, a maximum size of 500 square feet is permitted by right, with larger sizes permitted through conditional use review, and the approval criteria included an evaluation of the developer and/or tenant's business plan. When the city did not see the establishment of SEW uses, it revisited the regulations to increase the maximum by-right size to 1,500 square feet.

Figure 5. Future industrial incubator in Marshfield, Wisconsin

Source: Hub City Times (Adam Hocking)

Applicability to the Jackson East Subareas

The multiple rural-residential lots in Subarea B have been designated Industrial in the Comprehensive Plan land use map. However, the parcelized nature of these sites and those in Subarea A can pose an issue to the assembly of sufficient property for industrial development. The application of zoning that allows both residential and flex/light industrial uses is a potential interim approach to transitioning the Subareas from residential to industrial uses. Existing residential and non-residential buildings could be converted to "incubator spaces" until the market or the ownership pattern supports redevelopment.

These changes in use from agricultural or residential could trigger City requirements for infrastructure improvements related to sewer, water, transportation, and stormwater, which

[2] Hub City Times, "Industrial incubator, Spencer business coming to Yellowstone Industrial Park," May 2, 2016. Available online at https://www.hubcitytimes.com/2016/05/02/industrial-incubator-spencer-business-coming-to-yellowstone-industrial-park/Retrieved September 13, 2016.

[3] City of San Francisco Planning Code, Section 20.102 Definitions. Available online at http://library.amlegal.com/nxt/gateway.dll/California/planning?f=templates$fn=default.htm$3.0.

could present barriers to the type of small-scale manufacturing being considered. If this approach is pursued, policy discussions related to fees and permitting would need to be convened.

Lessons Learned

As the definition of manufacturing broadens, there are opportunities to focus on emerging technologies and businesses. The concept of "incubator spaces" can provide a foothold for small, local businesses and would allow the City of Hillsboro to provide a full range of industrial facilities as those businesses grow and provide a path for the gradual transition of existing residential and agricultural uses to industrial uses.

If the City of Hillsboro moves forward with the allowance or encouragement of "industrial incubator" uses, new regulations to allow or encourage small-scale manufacturing should provide some flexibility. San Francisco's initial SEW regulations, while allowing smaller industrial spaces, were overly restrictive and did not result in the creation of those spaces.

B. Industrial and Residential Use Proximities

The Jackson East Subareas currently consist primarily of residential properties and uses. Existing and potential new residential development within the Subareas must account for proximity to future industrial uses. Zoning, the government's assignment of allowed uses for properties, was first utilized in 1916 in order to limit noxious impacts from development and uses. In the early- to mid-1900s, zoning was used to separate often-noxious industrial uses, such as tanneries and coal processing plants, from areas of residential dwellings. This practice continues today.

The City of Hillsboro is working diligently to stimulate industial uses in the IRA with efforts to create a world-class area competiting globally for new investment. Potential new industrial and residential land uses in close proximity can create reasons for concern. Industrial users may be concerned that adjacent or proximate housing will limit their ability to achieve business success due to complaints from residential neighbors. Such concerns may also impact the value of the industrial land as the potential users may be limited to lower-impact industries thereby decreasing the marketability of the land. Likewise, residential developers or homeowners may be concerned that impacts from adjacent industrial uses such as noise, emissions, and traffic can decrease the desirability of an area, affecting land value and quality of life. This section looks at how to address the interface between these different uses.

Examined Practices

Commonly-used approaches for addressing the interface between industrial uses and residential are buffering, transition policies and aesthetic treatments. Each of these approaches is described in more detail below.

Buffering

Buffering refers to the physical separation of uses with distance and possibly structures. In the Portland region, several communities beyond the City of Hillsboro have adopted buffering requirements, including the Cities of Beaverton and Gresham.

The City of Hillsboro employs buffer requirements between industrial and residential uses. As described in Subchapter 12.25 Industrial Zones, several of the City's industrial zones require standard setbacks of 25-35 feet if abutting residential properties.

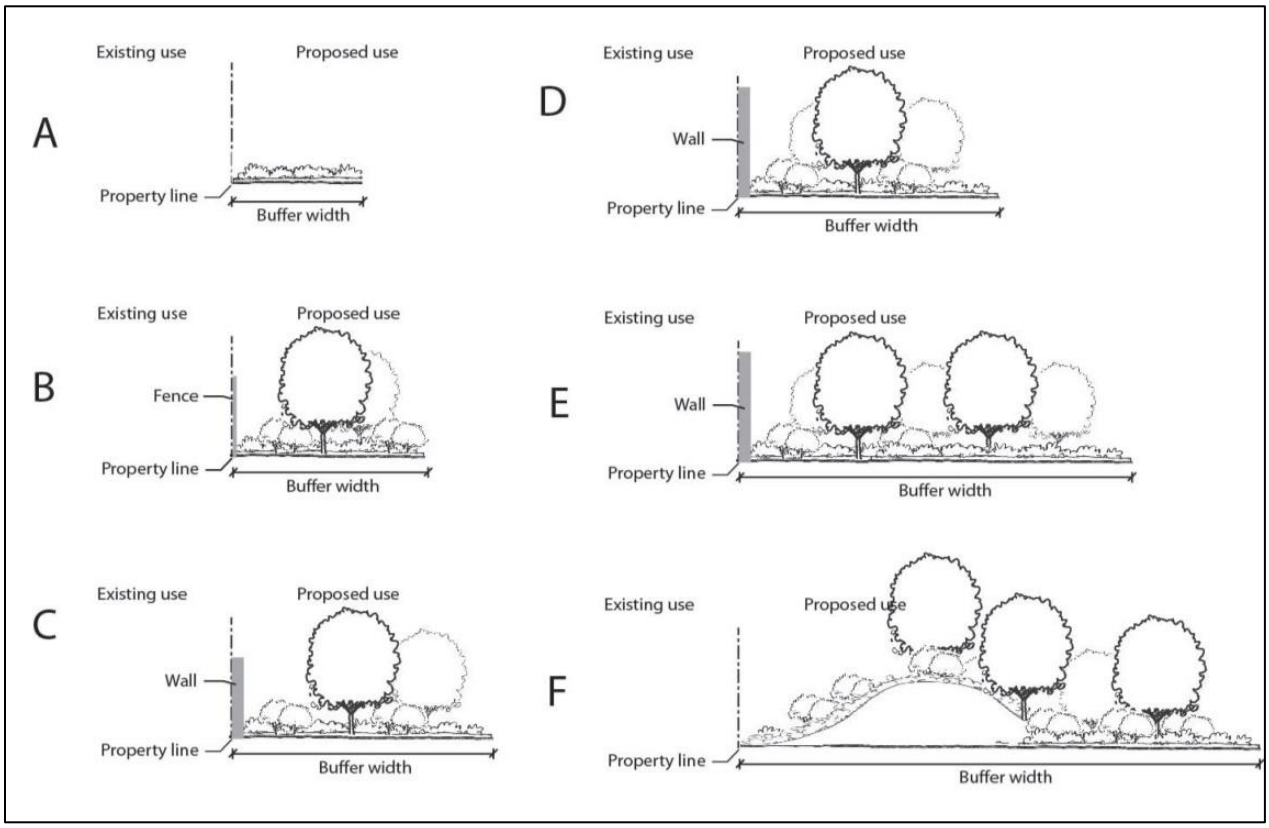
The City of Beaverton has proposed a similar approach for its South Cooper Mountain subarea, which was brought into the UGB in 2011. The primarily residential development proposed for the area will abut a road that is urban on one side and rural on the other. In order to provide a gradual transition between the rural and urban areas, development abutting SW Tile Flat Road is required to provide a landscaped buffer with trees and shrubs to provide a visual screen for residents across the street. See Figure 6.

Figure 6. Urban to rural treatment proposed for SW Tile Flat Road

Source: City of Beaverton South Cooper Mountain Community Plan, November 26, 2014

The City of Gresham employs six buffer typologies to address the potential level of conflict between uses and district character. As shown in Figure 6, relatively compatible uses such as duplexes adjacent to single-family detached housing require a buffer of 10 feet of landscaping with no screening required. As shown in Figure 7, buffer typologies E and F are specifically designed to protect housing from industrial users. They rely on both wider buffers (30-40 feet) and structural elements such as walls or berms to mitigate impacts related to views and noise.

Figure 7. Standards A through F of Gresham Oregon's Development Code



Source: City of Gresham

Standard F above is used solely for properties within the Springwater Community Area, which was added to the UGB near Gresham in 2005. The wider, landscaped buffer standards were developed in response to the dramatic change that nearby residents expected, and to preserve the value of lands within the expansion area that were planned for commercial and residential use.

As shown in Figure 8, although these standards provide buffers between potentially conflicting uses, they also have the effect of reducing the usable area of an industrial site. For example, a property with a 600 foot property line adjacent to a residential property would need to provide a buffer 40 feet in width, removing just over one-half acre of developable area from the site. Such a treatment could impact the value of edge properties as compared to those not abutting residential areas.

Figure 8. Standards E and F of Gresham Oregon's Development Code

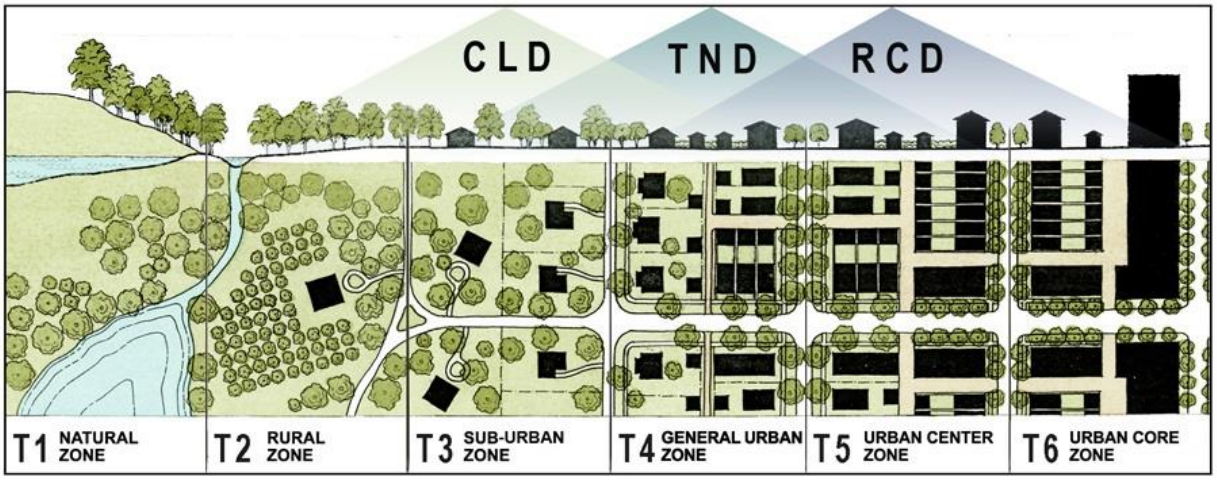
Landscaping Standard	Intent	Options	Minimum Buffer Width	Trees	Shrubs	Screening (continuous and site obscuring)
E high wall and larger buffer width	The E standard is a landscape treatment that provides enhanced physical separation in addition to that provided by the C and D standards because of the potential effects of industrial uses. The E standard requires extensive visual screening and reduction of noise transmission at the ground level is required.	N/A	30 feet	1 per 15 linear feet	60 shrubs per 100 linear feet of landscaped area	A minimum 8-foot masonry wall
F high berm and maximum buffer width	The F standard is intended to be used in special instances where the largest physical separation is needed and the most extensive screening of both visual impacts and reduction of noise transmission is needed to protect abutting sensitive uses.	N/A	40 feet	1 per 15 linear feet (trees maybe placed on berm)	90 shrubs per 100 linear feet of landscaped area (shrubs may be placed on berm)	A minimum 6-foot berm For berms less than 8 feet, shrubs, trees or a combination of the two landscape elements must be planted at or near the top to ensure the overall 8-foot screen height

Source: City of Gresham

Transitioning Uses

Transitioning uses can occur through approaches like the Transect, shown in Figure 9, which was created by Duany Plater Zyberk (DPZ). The Transect graphically describes the gradual transition between higher- and lower-intensity land uses through zoning. Form-based codes, which focus on the placement and form of buildings and density ranges rather than on the uses that occur within, are typically used to designate the locations of the Transects. Form-based codes focus on the appearance and function of a community with the belief that the uses most appropriate for that transect will locate there.

Figure 9. The urban to rural transect



Source: Transect Diagram by DPZ & Company, modified by S. Sorlien 2010. Available at andysorlien.com/smartcode.htm.

The City of Tualatin utilizes a Euclidian zoning code to create use transitions between employment land and housing. The city has a large core of land designated as Manufacturing General MG, which covers a large expanse from south of Tualatin Sherwood Road to north of Highway 99. Between the MG area and residential areas, the city has adopted light industrial zones, such as Business Park MP or Manufacturing Light ML, to provide a gentler transition between the heavy industrial uses permitted in the MG zone and the residential areas.[4]

Another example of transition zoning is found in San Diego, California. To protect important employment lands near the waterfront, the Unified Port of San Diego worked with cities to include transition zones within their local ordinances. The following Key Principles guided the development of transition zones:

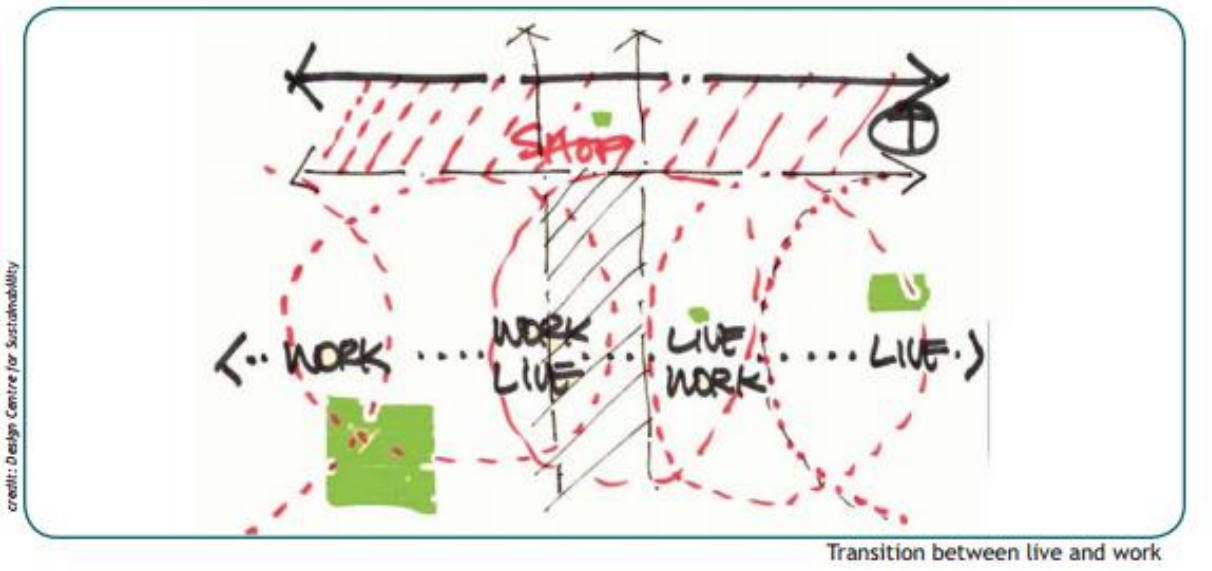
- Transition zones should provide mandated separation between industrial and residential land uses, safeguarding the environmental health of the regional neighborhoods and residents.
- Transition zones should protect and enhance the existing and prospective operations of the businesses … to include visitor-serving, commercial, retail, industrial, working-waterfront, and maritime related, job-producing industries
- Transition zones should only permit uses that do not pose a health risk to sensitive receptor land uses adjacent to or in the near proximity.[5]

In the San Diego example, lands near the port and related industry were generally designated for non-residential commercial, retail, and clean industry. This transition area protected the residential areas from industrial impact, while simultaneously insulating the industrial operators from complaints, or escalating land prices that could lead to non-industrial redevelopment.

[4] City of Tualatin Zoning Map
[5] Port of San Diego transition zone policy. Available at https://www.portofsandiego.org/bpc-policies/1429-bpc-policy-no-725-transition-zone-policy/file.html (retrieved September 8, 2016). Port of San Diego transition zone policy https://www.portofsandiego.org/bpc-policies/1429-bpc-policy-no-725-transition-zone-policy/file.html

The "Plan it Calgary" project in Calgary, Alberta, focused on the right mix of uses as a way of supporting business in their industrial area. In this case, the city was looking to shift an area from heavy industry to more "flex" employment, with a mix of light industrial, office and commercial use. As shown in Figure 10, work/live and live/work areas were proposed to provide a transition zone between work/employment and residential areas.

Figure 10. City of Calgary proposed transition between Live and Work

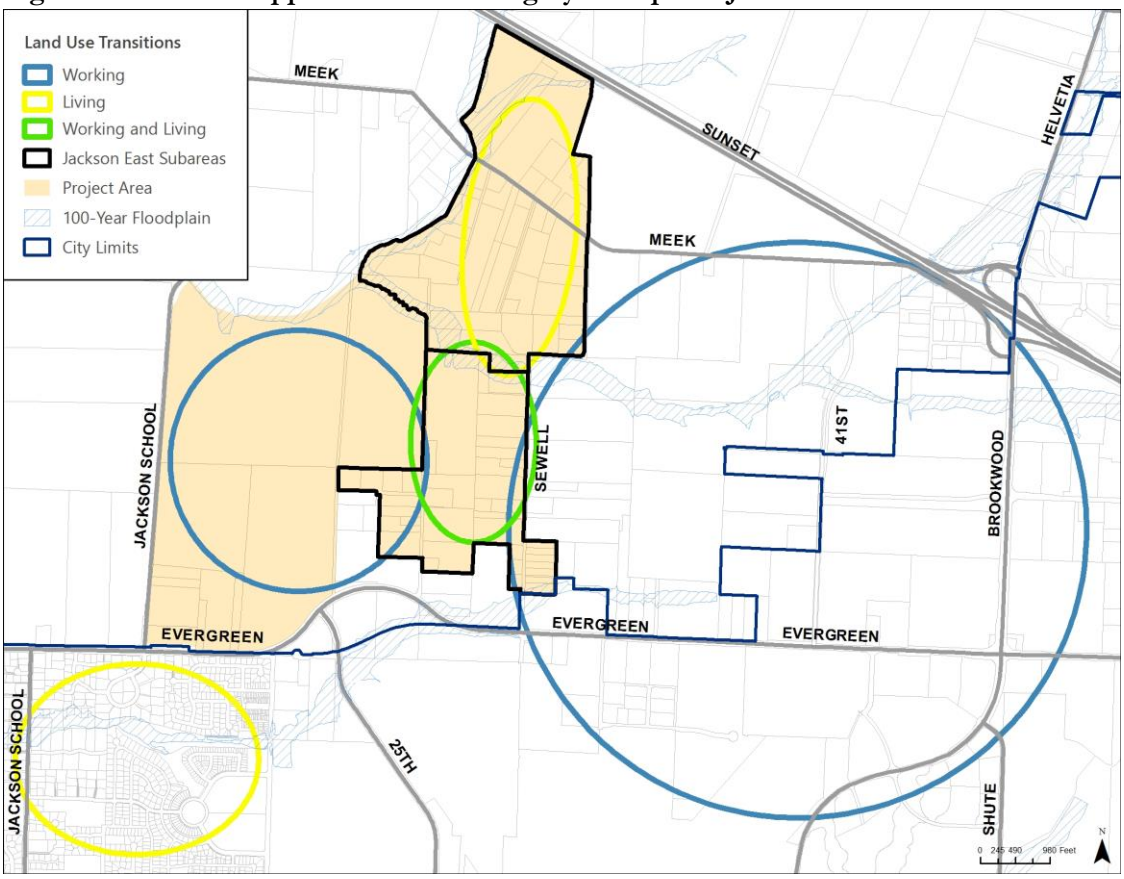


Source: Design Centre for Sustainability.

Applicability to the Jackson East Subareas

Numerous communities have worked to develop transition solutions between potentially conflicting uses. In and around the Jackson East project area, the concept of transition benefits multiple users. Areas to the east and west of Subareas A and B are currently or will be designated to accommodate future traded-sector employment uses. Though U.S. Highway 26 provides a boundary to the north, prospective employers may be concerned about nearby residential users impacting their operations. Likewise, potential residential growth in existing rural-residential areas could encounter impacts from industrial uses. See Figure 11 for a conceptual approach to applying the Calgary example to Jackson East.

Figure 11. Potential application of the Calgary example to Jackson East Subareas



Source: City of Hillsboro, Metro RLIS, and Washington County GIS data

Lessons Learned

Designating a portion of the rural-residential lands as light industry or business parks, similar to the Tualatin approach could provide the separation desired by the future surrounding industrial users.

C. Hillsboro Airport Compatibility

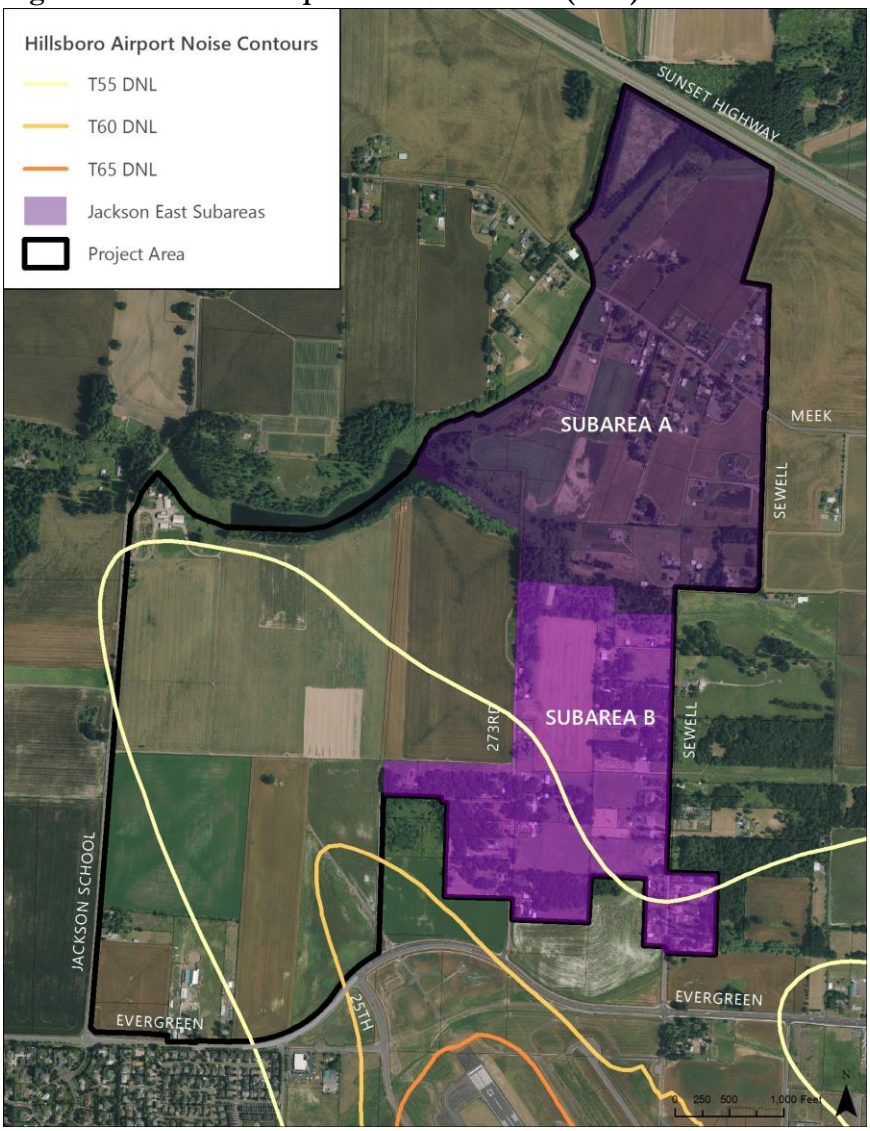
HIO is located to the south of the Jackson East project area. Though outside of the project area, the airport is critical to the region and the project area both as a transportation hub and as a use with specific needs related to safety. The proximity of the airport must be considered when evaluating appropriate land uses within the Subareas.

Generally, airports are concerned with land use compatibility due to noise and safety. Airports attempt to limit sensitive land uses such as residences, schools, and hospitals in close proximity to the airport to minimize exposure to aircraft noise and limit the potential for loss of life and injury if there is an accident. Airports also attempt to limit uses that are hazardous to airspace and overflights, such as tall structures, visual obstructions, and wildlife and bird attractants, and uses that present a high-risk of accident severity in the event of a crash.

The noise contours of HIO extend into the Jackson East project area. See Figure 12. The FAA has determined that most land uses (including residential) are appropriate where average noise exposure is less than 65 day-night-level (DNL). However, the Oregon

Department of Environmental Quality (DEQ) has taken a more conservative approach and requires noise mapping of the 55 DNL contour to inform local land use planning. As shown in Figure 12, the 65 DNL contours are largely located on property owned by the Port of Portland. Within the project area, the 55 DNL contour extends north from the airport and covers a portion of Subarea B.

Figure 12. Hillsboro Airport Noise Contours (2007)



Source: City of Hillsboro, Metro RLIS, Washington County, and Port of Portland GIS data

HIO is a regional airport that serves both private and public users. The largest users of the airport are Fixed Base Operations, or FBOs (Global Aviation, Aero Air, and Hillsboro Aviation) and Intel. Nike also flies out of this airport and base their corporate aircraft here as well. Hillsboro Aviation and the Hillsboro Aero Academy are located in the airport. The Hillsboro Aero Academy provides helicopter and airplane flight training (one of the largest in the nation). Although the training flights use designated flight training paths to minimize noise impacts to nearby residential areas, the helicopter training program generates the majority of the noise complaints received by the airport. A new parallel runway was

constructed in 2015; minimal changes to helicopter, small aircraft, and large aircraft training patterns are expected.[6]

HIO launched an Airport Master Plan update in fall 2016. New noise contours and a new Airport Layout Plan will be generated from the Airport Master Plan updated project that will likely be completed over the next two years. At the time of this writing, no additional acquisition of properties to the north of Evergreen Blvd is planned.

Examined Practices

The Jackson East Subareas are located within 10,000 feet of the HIO airfield perimeter fence. The area outside of the perimeter fence has been identified by the Port of Portland as the "Secondary Zone". This zone is not managed by the Port; however it is an area where the Port requests to work with the governing agency (in this case the City of Hillsboro) during planning efforts to review compatibility of stormwater management practices with aviation safety.

The Jackson East Subareas expected to urbanize, and to do so in close proximity to the HIO runway takeoff area. The Hillsboro example is not unique; historically, many airports were established at the edges of communities that have since grown around them. As a result, the FAA and the State of Oregon have created a "toolbox" of approaches to mitigating airport-related impacts and protecting airport operations, including:

- Comprehensive Plan policies that ensure land use compatibility near an airport.
- Land use regulations limiting uses, heights, and densities near airports
- Transfer of development rights
- Fee-simple acquisition of affected properties
- Easements (avigation, conservation) that prevent incompatible development

The Oregon Department of Aviation identifies a number of land use compatibility techniques in its 2003 "Airport Land Use Compatibility Guidebook," as well of potential challenges of applying each. See Figure 13 for a summary.

[6] Information available at http://www2.portofportland.com/Airports/Hillsboro/flightPatterns (retrieved August 31, 2016).

Figure 13. Preventative Techniques for Establishing Compatible Land Uses

Preventive Measures				
Technique	**Description**	**Advantage**	**Disadvantage**	**When to use**
Comprehensive Planning	Mandated by Oregon Law; describes all future land use for the community	Low cost and minimal controversy if airport is not in a developed area	Not effective when existing incompatible development has encroached on the airport; only effective when supported by zoning	Each time a comprehensive plan is developed or updated, steps should be taken to ensure land use compatibility in the airport environs
Coordination Agreements	Agreement between two or more jurisdictions that are impacted by an airport	Most applicable when airport and area of influence are located outside the physical boundaries of the public sponsor (example: City of Eugene is the sponsor for the Eugene Airport which is located in the unincorporated community of Lane County)	Ineffective unless all parties share similar land use planning goals and objectives for areas in the airport environs	When comprehensive plans are updated and/or urban growth boundaries (UGBs) are amended
Urban Growth Boundaries	Mandated by Oregon Law; limits the developable area within a community	Controls the growth boundaries for a community	Many airports are located within UGBs. This can place the development pressures on property near the airports where adjoining development may be incompatible	Where opportunities present themselves, efforts should be made to have UGB limits and the associated development complement the airport-related safety areas
Airport Overlay Zone	Places additional conditions on affected land; underlying zone remains unchanged	Easy to implement, reduces hazards and incompatible land use	If land use is incompatible in underlying zone, this incompatibility will continue	Required by APR
Airport Development Zone	Creates separate zoning districts for airports	Creates a more distinct area of influence for the airport; gives the airport better opportunity to expand for airport-related dependent and compatible uses; avoids possible unintended uses that often accompany an overlay zone	Does not include areas beyond airport property; adjacent land uses can still be incompatible	Most applicable to airport property and identified expansion areas
Height Restrictions	Safety mandated by Oregon Administrative Rule Chapter 738, Division 70 - Physical Hazards to Air Navigation within the airport object-free zone	Prevents the location of objects which pose violations to FAR Part 77 surface	Only effective in preventing new height obstructions; may not be effective when terrain or trees are obstructions	Should be adopted as part of zoning to support land use identified in comprehensive plan. Required by APR

Source: Oregon Department of Aviation. Available online at http://www.oregon.gov/aviation/docs/resources/chapter_six.pdf. Retrieved on November 16, 2016.

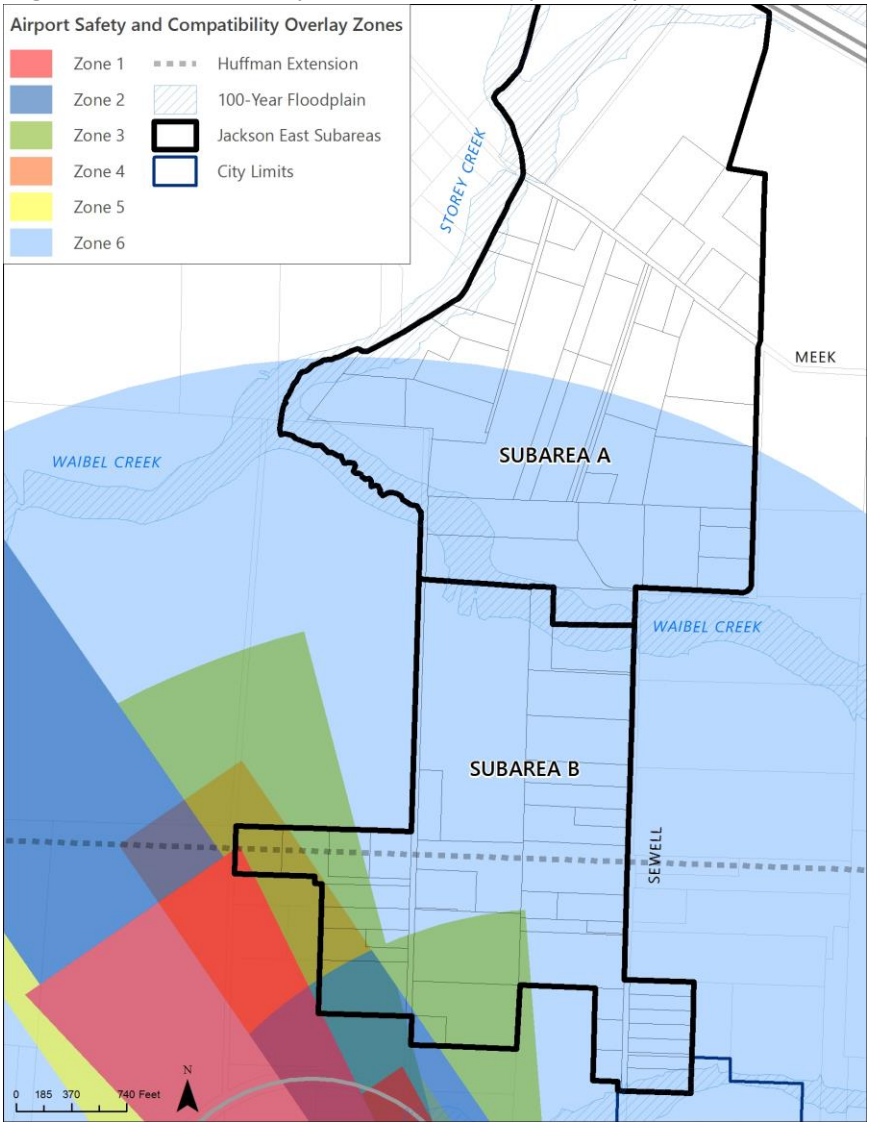
Land Use Regulations

The most common approach to regulating land use and development near airports is to adopt airport-compatible zoning regulations as either a base or overlay zone, which in turn implements use and development restrictions near the airport.

The City of Hillsboro adopted an Airport Safety and Compatibility Overlay zone and an Airport Use zone in 2009. This overlay zone was written to comply with State guidance to ensure airport-compatible land uses in the vicinity of the Hillsboro Airport. However, the zones were appealed to the Land Use Board of Appeals and the Oregon Court of Appeals, and following that ruling, the City discontinued further work on the AU and ASCO Zones, though they still exist on paper in the Zoning Ordinance. It is expected that the zones will be rewritten either concurrent with or following the Hillsboro Airport's Master Plan update.

There are six separate overlay zones, most of which have unique limitations regarding land use, residential and employment density. As Figure 14 shows, much of Subarea B and approximately a third of Subarea A is covered by Zone 6.

Figure 14. Airport Safety and Compatibility Overlay Zones



Source: City of Hillsboro, Metro RLIS, and Washington County GIS data

Generally, the zones prohibit facilities where large groups of people will gather, such as churches and athletic fields, or where vulnerable people will gather, such as childcare facilities, schools, and hospitals, and establishes maximum residential and employment densities. Generally, land use regulations should address noise compatibility; building height; outdoor lighting; industrial emissions; communications facilities; and water impoundment and wildlife attractants (such as stormwater detention facilities).

Transfer of Development Rights

The concept of Transfer of Development Rights (or TDR) allows a property owner (sender) to transfer the development rights attached to the property to a recipient (receiver). Typically, the sending and receiving zones are designated by zoning, and the TDR allows properties designated as community resources (historic buildings, natural areas) to retain the value of the development rights associated with that property.

This tool could be used to allow transfer of rights from properties within sensitive airport-adjacent locations to other properties within the community. The receiving zone could be limited to Jackson East.

Fee-simple acquisition of affected properties

The Port of Portland has purchased properties located within the RPZ in order to minimize conflicts with airport operations. At this time, Port staff indicate that the airport has no plans to acquire additional property.

Easements

In some jurisdictions, airport sponsors are able to require avigation and/or noise easements. The purpose of the easement is to limit the potential for the development of structures or uses that could interfere with airport operations. In all cases the property owner retains the ownership and the use of the property, subject to the restrictions applied by the easement.

Avigation easements refer to easements that may preclude future development on a site, or limit the height of vegetation. A noise easement provides notification to property owners that the property may be subject to noise impacts. Conservation easements restrict the type of development than can occur on a property, and are typically best suited to farmland or open space land.

Applicability to the Jackson East Subareas

The Jackson East Subareas, especially Subarea B, are located near the Hillsboro Airport and will experience some of the benefits and challenges that location entails. New ASCO Zone regulations for the Jackson East Subareas will continue to include compatibility standards related to noise, building height, building emissions, etc. that will impact Subareas A and B.

The noise contours of the airport do not appear to limit residential development north of Waibel Creek, but residential development in the western portions of Subarea B will likely be incompatible with the airport. There are limitations to the number of employees per acre within the overlay zones, ranging from 60 people per acre in Zone 2 to no maximum in Zone 6.

There are potential issues related to stormwater management within the project area and restrictions on standing water, as you might find in a stormwater detention pond. The Port of Portland will want to coordinate with restoration of the creeks in the project area and establishment of new stormwater facilities. These concerns can likely be alleviated by using the Port of Portland's stormwater management guidelines.

Lessons Learned

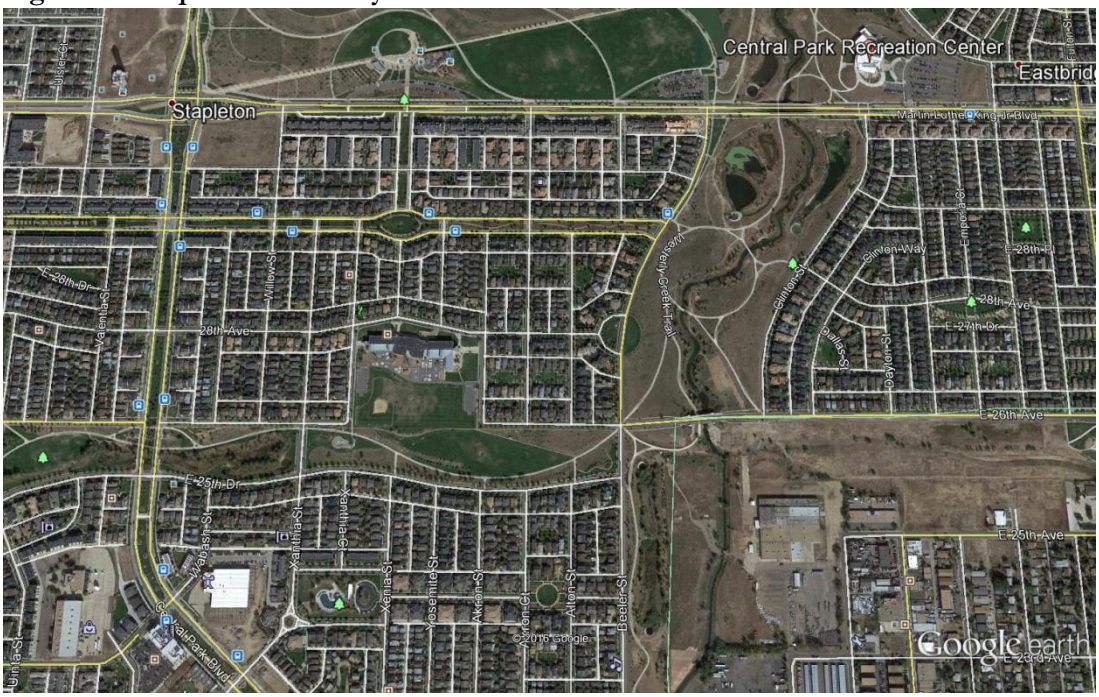
In the absence of land use compatibility regulations, the City of Hillsboro could run the risk of permitting incompatible land uses that create conflict between the airport and other users. To avoid that outcome, close coordination with the airport is suggested.

D. Natural Areas as an Organizing Principle for Development

Plans for the Crescent Park Greenway, being studied to follow Waibel Creek, would include potential enhancement of the creek area for stormwater and natural resource mitigation. Such an activity would likely enhance the creek to provide an amenity for the area and provide for public access. Enhancements to natural areas such as Waibel Creek and Storey Creek can serve as an organizing principle for development.

One example of such a treatment can be seen in the planned community of Stapleton near Denver, Colorado. The designers utilized floodway corridors for both natural treatment and storage, and for recreationg and enhanced views. See Figure 15.

Figure 15. Stapleton Floodway Corridors



Stapleton, shown above oriented development to focus on access to the Westerly Creek drainage.

There are several noteworthy elements of the Stapleton approach. Notably, a more conventional development would place the drainageway behind a back yard fence. Stapleton instead placed roads and walkways at the edge of the creek, providing visual access to everyone in the community. The drainage also plays host to trails and recreation facilities.

Of note, the greenspace is designed to continue to allow storage of floodwaters and the environmental functions of the creek. When flooding occurs, only simple cleanup of pathwyas and other outdoor structures is required. The Westerly Creek functions as an amenity for the entire community and contributes to the higher than typical values of the properties within Stapleton.

Industrial applications with open space amenities are also possible. Dawson Creek, near the Hillsboro Library and the FEI company in Hillsboro provides a great example. A combinations of drainageways, ponds and flood plain are integral to the beauty of the developed area. Further, pathways provide visitors and employes with access to the outdoors. Access to such amenities can aid companies as they work to recruit and retain quality employees. See Figure 16.

Figure 16. Dawson Creek Greenspace

Greenspace as a focal point for employment land development in Hillsboro, OR

This approach could be applied to both the Jackson East project area and IRA by creating opportunities within the creek corridors that satisfy flow attenuation in a comprehensive manner while also enhancing the area's aesthetics and providing additional outdoor recreational opportunities.

In addition to meeting requirements of Clean Water Services (CWS), the City of Hillsboro, and guidelines from the Port, the City has expressed interest in making use of the existing natural areas within the Jackson East project area by locating regional or stormwater management facilities along the planned Crescent Park Greenway. As indicated by FAA Advisory Circular 150/5200-33, *Hazardous Wildlife Attractants On or Near Airports*, longer, narrow stormwater facilities are encouraged, which would complement this configuration, as well as provide a buffer between pedestrian facilities and adjacent industrial and residential land uses.

The Jackson East project area is relatively flat with limited drop to convey stormwater into nearby Waibel Creek and Storey Creek. Planning efforts should focus on identifying locations and types of facilities that meet requirements based on future zoning as well as feasibility of construction and implementation. Locating regional facilities along greenways as much as possible will maximize the area available for development as well as potentially provide a buffer for the future Crescent Park Greenway.

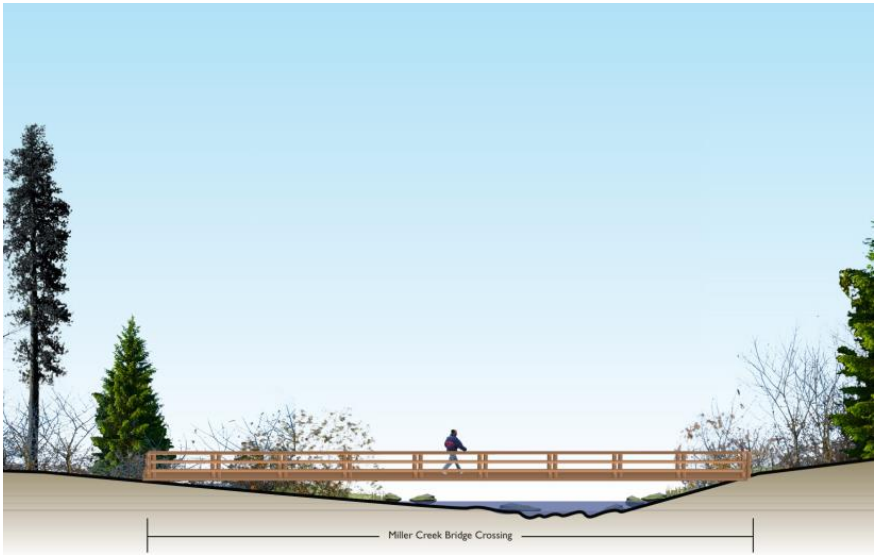
Stormwater facilities are preferred to provide combined water quality and water quantity mitigation, however further analysis could show that separating these treatments into individual facilities would be more efficient depending on topography, groundwater, and location characteristics. Figure 17 shows examples of both above and below ground stormwater facilities that could be considered for the Jackson East Subareas.

CWS has expressed interest in exploring stormwater management approaches that utilize stream enhancement to mitigate increased stormwater runoff. This approach would need to be explored in a more detailed level of analysis to determine feasibility and cost for the project area.

Figure 17: Examples of Regional Scale Facilities near Path

Residential Buffer

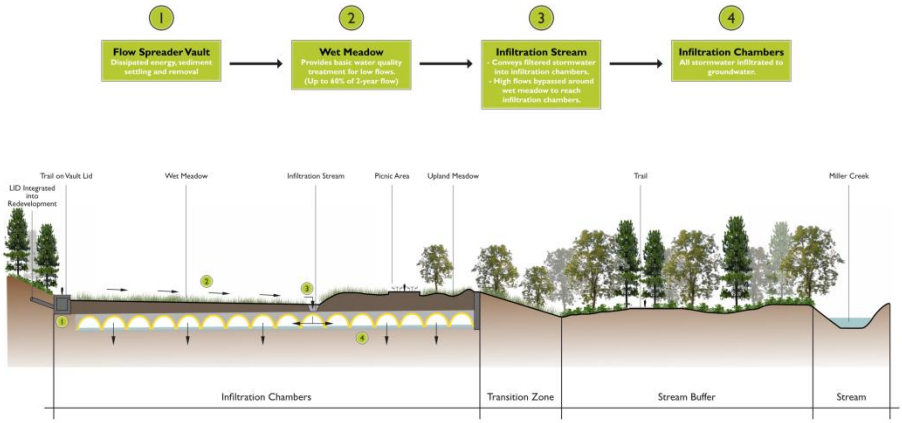
Multi Use Path between Storm Facility and Channel



Pedestrian Bridge Crossing Over Channel

Section View Path between Storm Facility and Channel

Section View Path between Storm Facility and Channel



Alternate Regional Facility (Underground) With LIDA (Non-Regional) Treatment

Applicability to the Jackson East Subareas

The proposed approach for managing stormwater throughout the Jackson East subareas, per discussions with the City of Hillsboro and CWS, is to construct regional stormwater treatment and detention facilities that would be owned and maintained by the City. These facilities would be sized based on zoning and density of contributing area. If constructed in advance of development, these facilities will actually be sized for anticipated full build-out of the subareas based upon the estimated amount of impervious area that would be generated.

If the City knew what was going to be built, these facilities could be sized based upon the actual amount of impervious area to be constructed. Once a land use plan is adopted, the City can move forward with site identification and design of regional facilities and stream enhancements to serve the area's stormwater management needs. It is critical that funding be explored for these regional facilities.

Several regional facilities, and in some cases private facilities needed to supplement the regional facilities, will be required to provide stormwater treatment and detention for both subareas that drain towards Waibel and Storey Creeks. Regional facilities would be able to be drained within 48 hours of inundation, and also shaped in a linear manner and planted in

a way that would deter nesting of waterfowl. Impacts to wetlands and other sensitive areas should be avoided as much as possible, though in some areas impacts will be inevitable as roads will cross creeks and wetlands, therefore requiring facilities to meet additional CWS, and in some cases federal and state, stormwater management standards.

As noted previously, coordination between the City and the Port of Portland will be necessary as development in the subareas moves forward. It is also in the City's interest to coordinate with CWS and possibly the Department of State Lands and U.S. Army Corps of Engineers during planning phases to explore methods of managing stormwater that will lead to construction of facilities or creek enhancements that are more efficient and could create positive impacts within the Waibel and Storey Creek corridors.

Lessons Learned

A regional stormwater master plan and associated implementation plan will be necessary to formulate and adopt for this area given the City's preference to manage stormwater using regional facilities. These plans will need to provide clear guidance for what is required along with flexibility to allow for variation in phasing of development. The implementation plan should also contain a mechanism for funding the facilities based on timing of construction and extent of buildout.

IV. Conclusion

Jackson East's Subareas A and B were brought into the UGB in 2014 and 2005 respectively for future employment. Subareas A and B have no additional conditions attached to their being brought into the UGB. This provides additional flexibility regarding their potential development.

The Jackson East Subareas are close to existing and planned industrial land to the south, east, and west. The Jackson East Subareas Master Planning effort to be completed should further consider options for these Subareas' development. The effort should also develop an approach for protecting potential disparate uses. The Jackson East Subareas' rural character, and existing natural resources and habitat areas, will also be guiding forces in planning and development.

The research presented through this report will be joined with background reports on 1) market analysis, 2) transportation infrastructure, and 3) public utilities and services in order to provide place making options and guidance for the development of the Subareas Master Plan. Ultimately, this Master Plan, accompanied by a detailed implementation guide, will help shape future land use policy, regulations, response to regional requirements (such as Metro's Title 11) and assignment of public investments and partnerships.